EXHIBIT 3

MONITORING AND MODELING WORK PLAN IN SUPPORT OF THE LTCP UPDATE

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FIGURES

1. INTRODUCTION

The following Work Plan is presented to generally describe the work to be accomplished in the Monitoring and Modeling Program. The monitoring program will span two years (2004 and 2005) and will focus on water quality conditions from mid-April through to mid-October.

The work plan, described in the following sections, builds on previous modeling and monitoring efforts such as the recent Wet Weather Demonstration Study completed by ORSANCO.

The work plan presentation is organized into five main components:

1. Monitoring Program Planning,
2. Ohio River Characterization,
3. Tributary Characterization,
4. Source Characterization, and
5. Water Quality Model Application.

The work associated with each component is described below.

2. WORK PLAN

2.1 Monitoring Program Planning

The number of samples required and the timing of sample collection is an important component of the water quality monitoring strategy. MSD will strive to optimize the application of monitoring resources by careful program pre-planning and by the use of real time radar.

The response time to rainfall for the Ohio River, for each of the tributary streams and rivers, and sources differs. The size of the contributing watersheds during a storm, the individual river/stream hydraulics, as well as the nature of the individual rainfall event, all contribute to defining response characteristics. Similarly, the response times for the CSO, SSO and stormwater sewersheds differ based on similar factors.

MSD, through the use of existing river and sewershed monitoring data and with the application of modeling tools, will characterize the response of the watersheds and sewersheds to various historical rainfall inputs. From this collection of information, MSD will be able to pre-plan the duration and optimum inter-sample times for each sample location and establish sampling goals for each location. Through the pre-planning process MSD expects to obtain suitable coverage of river, stream and source hydrographs and pollutographs from the rising and receding limbs to characterize water quality.

In addition, MSD will employ real time radar data to assist in determining the areal extent and timing of storm events while monitoring is ongoing. The radar information will be used to make operational decisions to adjust sampling durations in river, streams and at source sampling locations. Pre-planning of the field activities with the ability to make operational decisions on a sampling event basis will maximize the use of MSD's resources.

The outcome of the pre-planning process will be a detailed Field Sampling and Monitoring Program (FSMP) and Quality Assurance Project Plan (QAPP). The FSMP and QAPP will identify monitoring and sampling stations, define sampling goals, detail monitoring and sampling protocols and define quality objectives. The QAPP will be prepared in accordance with the appropriate applicable sections of US EPA Guideline EPA QA/G5 (EPA/600/R-98/018, February, 1998).

2.2 Ohio River Characterization

2.2.1 Ohio River Water Quality Modeling

Update Hydrodynamic Model: The existing hydrodynamic model (RMA-2V) structure will be updated for the river reach from RM 460 to RM 490 to facilitate the analysis of a wide range of flow conditions. The update will include conversion of the existing RMA-2V model to continuous operation, development of hydrodynamic models of the larger Ohio-side tributaries, and linkage of those tributary models to the Ohio hydrodynamic model. The update may also include the incorporation of lateral flow inputs from the major tributaries. The calibration of the hydrodynamic model will be updated as necessary.

Update the Structure of the Existing Ohio River WASP Model: The structure of the existing Ohio River WASP model will be reviewed in detail and refined as necessary consistent with the hydrodynamic model refinements described above. MSD expects that updates and refinements of the models' structures will extend downstream to a point immediately upstream of the Great Miami River confluence, at (approximately) Ohio River Mile 490.

Update the Calibration of the Ohio River WASP Model and Hydrodynamic Model: Using the results of the Ohio River monitoring program and the revised hydrodynamic model, the calibration of the Ohio River WASP model will be updated for the river reach between RM 460 and RM 490. The water quality calibration will be exclusively for *E. Coli.*

Coordinate Ohio River Model Efforts with Tributary Modeling: The updated Ohio River WASP model, as well as the supporting Ohio River hydrodynamic model, will be configured to accept tributary inflows for the river reach between RM 460 and RM 490.

2.2.2 Ohio River Water Quality Monitoring

The Ohio River monitoring program includes both dry and wet weather monitoring. As illustrated in Figure 1, a combination of longitudinal and channel transect sample stations will be used. The monitoring program will span two years (2004 and 2005) and will focus on water quality conditions from mid-April through to mid-October.

Ohio River Monitoring Limits: The Ohio River monitoring will focus on a 30-mile stretch of the Ohio River. The upstream and downstream boundary locations are River Mile 460 (confluence of Four Mile Creek and the Ohio River) and River Mile 490 (immediately upstream of the confluence of the Great Miami River and the Ohio River), respectively.

Longitudinal Sample Sites: Mid-channel longitudinal sample sites will be located at approximately 2-mile intervals. Longitudinal sites will be sampled once per dry-weather event and approximately 5 times for each wet weather event. Although the goal of the wet weather sampling will be to take one sample daily for five days, this sampling frequency may be modified based on the pre-planning process described above and operational decisions associated with each sampling event, as appropriate to adequately characterize water quality.

Transect Sample Sites: Approximately 7 transects will be defined between River Mile 460 and 490. Each transect will consist of 5 stations, at least one of which should be located in the center channel. Approximately 5 samples will be collected from each transect station for each wet weather event. Although the goal of the wet weather sampling will be to take one sample daily for five days at each transect station, this sampling frequency and the location of transect stations may be modified based on the pre-planning process described above and operational decisions associated with each sampling event, as appropriate to adequately characterize water quality.

Dry and Wet Weather Events: One to two wet weather events will be captured. Only one wet weather event will be sampled if the data developed is generally consistent with prior calibration of the river model. An additional two dry-weather events will be monitored.

Water Quality Parameter List: On-site monitoring will include dissolved oxygen, pH, conductivity and temperature. Based on the previous work carried out by ORSANCO, *E. Coli* will be the sole Pollutant of Concern (POC) for the Ohio River. Discrete samples will be collected for analysis of *E. Coli*.

2.3 Tributary Characterization

Tributary stream models for the Little Miami River/Duck Creek, Mill Creek, Rapid Run Creek and Muddy Creek will be calibrated for flow and water quality.

2.3.1 Tributary Water Quality Modeling

Common Elements of All Tributary Models: Model parameters will include *E. Coli.* and other parameters as appropriate based on the results of the monitoring program. Existing data and wet weather monitoring carried out during the LTCP Update will be used to establish the POCs for each stream individually. POCs will be established to assure that all parameters for which CSOs are causing or contributing to exceedances of Water Quality Standards are addressed. The monitoring results, once validated, will be compared to the appropriate Ohio Water Quality Standards. On the basis of this comparison, a list of POCs will be prepared for inclusion in the subsequent water quality modeling conducted pursuant to this plan. Model calibration will focus on POCs to be modeled, with particular emphasis on *E. Coli.*

Little Miami River: A conceptual illustration of the proposed Little Miami River WASP model is provided as Figure 2. The upstream boundary will be located at approximately River Mile 8.2, near Newtown Road. The WASP model includes branches of Duck Creek and Clough Creek. The USGS gauging station at Milford will be used to help define upstream boundary flows for modeling purposes.

Mill Creek: A conceptual illustration of the proposed Mill Creek WASP model is provided as Figure 3. The upstream boundary will extend to approximately River Mile 18.2, near East Crescentville Road. The USGS gauging station at Carthage will be used to help define upstream boundary flows for modeling purposes.

Muddy Creek and Rapid Run: A conceptual illustration of the proposed Muddy Creek and Rapid Run WASP models is provided as Figure 4. The extent of the models will be the mouth of the creeks.

2.3.2 Tributary Water Quality Monitoring

The approximate tributary monitoring locations for Little Miami River, Mill Creek, and Muddy

Creek and Rapid Run are provided in Figures 5 through 7.

The tributary monitoring program will span two years (2004 and 2005).

The dry-weather sampling program will include the collection of approximately 10 grab samples per site, as appropriate to adequately characterize water quality.

The parameter list will include total suspended solids, *E. Coli.*, dissolved metals, total phosphorus, soluble reactive phosphorus, ammonia, nitrite, nitrate, total Kjeldahl nitrogen, and total hardness.

Continuous flow and water quality (for pH, temperature, dissolved oxygen, and conductivity) measurements will be made at strategic stream locations during both wet and dry weather periods.

Wet weather sampling will be completed for a minimum of 3 events during the monitoring period.

Wet weather event sampling frequency goals (number of samples collected per storm event) at each sampling station will be established as part of the pre-planning process through the use of existing river and sewershed monitoring data and with the application of modeling tools to characterize the response of the watersheds and sewersheds to various historical rainfall inputs. Although the objective is to meet the sampling frequency goals set out, this sampling frequency may be modified based on operational decisions associated with each sampling event, as appropriate to adequately characterize the changes in discharge quality that take place over the course of each monitored event.

Event composite samples will be collected to determine average wet weather quality and will be analyzed for total suspended solids, dissolved metals, total phosphorus, soluble reactive phosphorus, ammonia, nitrite, nitrate, total Kjeldahl nitrogen and hardness.

Grab samples taken during a wet weather event will utilize the sampling frequency goals indicated above and will be analyzed for total suspended solids and *E. Coli.*

2.4 Source Characterization

The source monitoring programs address wet weather flows and loads associated with stormwater runoff, CSOs and significant SSO sources for Ohio side-sources in the Ohio River from RM 460 to RM 490 and the tributary streams noted in Section 2.3. These modeling programs will also address Kentucky-side sources to the extent information has been provided as discussed in paragraph 2.5.1, below, or is otherwise made available to MSD by the United States, the State of Ohio or ORSANCO. Nothing in this plan will be read to impose on MSD the obligation to collect data on the Kentucky side of the Ohio River.

2.4.1 Source Modeling

Modeling of significant SSO and CSO sources will be based upon the newly developed system wide collection system model. Stormwater flows will be generated using updated versions of the 1996 Long-Term Control Plan SWMM non-point source models.

2.4.2 Source Monitoring

Source monitoring will be completed at a minimum of 13 combined sewer locations (CSOs), 4 sanitary sewer overflow locations (SSOs), and 4 storm sewer outfall locations. CSO sites will be selected based on location, sewershed characteristics, overflow size, average annual overflow volume and frequency, configuration, upstream land use, and accessibility. The sites will be selected to provide a reasonably representative sampling of Defendants' active CSOs, based on typical year discharge characteristics.

1 to 2 stormwater sample locations will be selected per watershed.

SSO sites will be selected on the basis of location, overflow size, and accessibility.

Sites will be monitored for a minimum of 3 wet weather events.

Wet weather event sampling frequency goals (number of samples collected per storm event) at each sampling station will be established as part of the pre-planning process through the use of existing sewershed monitoring data and with the application of modeling tools to characterize the response of the sewersheds to various historical rainfall imputs. Although the objective is to meet the sampling frequency goals set out, this sampling frequency may be modified based on operational decisions associated with each sampling event, as appropriate to adequately characterize the changes in discharge quality which take place over the course of each monitored event.

Discrete source samples will be taken with the sampling frequency goals indicated above and will be analyzed for total suspended solids, and *E. Coli.*

Event composite samples will be collected at each site and will be analyzed for total suspended solids, dissolved metals, total phosphorus, soluble reactive phosphorus, ammonia, nitrite, nitrate, total Kjeldahl nitrogen, total carbonaceous biochemical oxygen demand and filtered carbonaceous biochemical oxygen demand.

2.5 Water Quality Model Application

2.5.1 Ohio River From RM 460 to RM 490, and Little Miami River/Duck Creek, Mill Creek, Rapid Run Creek and Muddy Creek

The water quality model application will involve the assessment of impacts, on Ohio-side tributaries and the mainstem of the Ohio River, for a representative year.

The water quality model application will include:

<u>*Definition of Baseline Conditions*</u>: Water quality models will be applied to generate water quality predictions for a representative year. In support of this baseline assessment, it will be necessary for regulatory authorities to provide flow time-series and pollutant data corresponding to Kentucky-side sources.

<u>*Development and Analysis of Scenarios*</u>: In conjunction with the development of the long-term control plan, a variety of management scenarios will be prepared. The corresponding water quality impacts, or improvements, will be assessed relative to the baseline case described above using the modeling tools. It is expected that regulatory authorities will provide the necessary flow time-series and pollutant data corresponding to Kentucky-side sources.

2.5.2 Ohio River From RM 490 to Markland Dam

Defendants will utilize the existing ORSANCO Ohio River model structure, operated in a continuous mode, to evaluate the impacts that Defendants' CSOs are expected to have on *E. Coli* levels in the Ohio River between River Mile 490 and the downstream Markland Dam if the proposed Long Term Control Plan Update is implemented. Defendants are only agreeing to perform this evaluation at the regulators' request. Defendants do not believe that the existing ORSANCO Ohio River model structure is adequate to perform this evaluation of the impacts beyond River Mile 490 and reserve the right to dispute the accuracy or reliability of the results of this evaluation of the impacts beyond River Mile 490.

Exhibit 3: Figure 1 General Sample Station Locations for the Ohio River

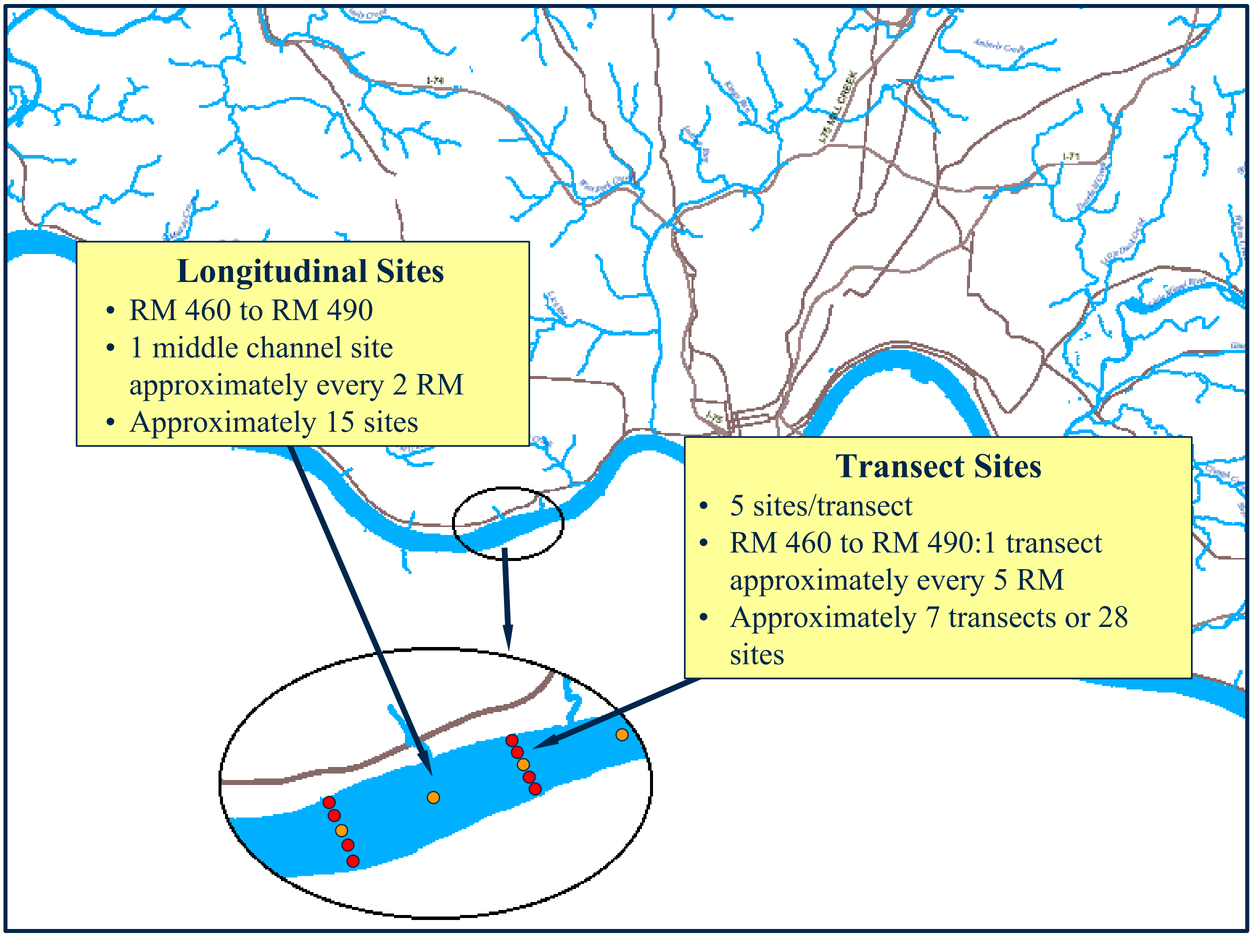

Exhibit 3: Figure 2 Conceptual Little Miami River WASP Model

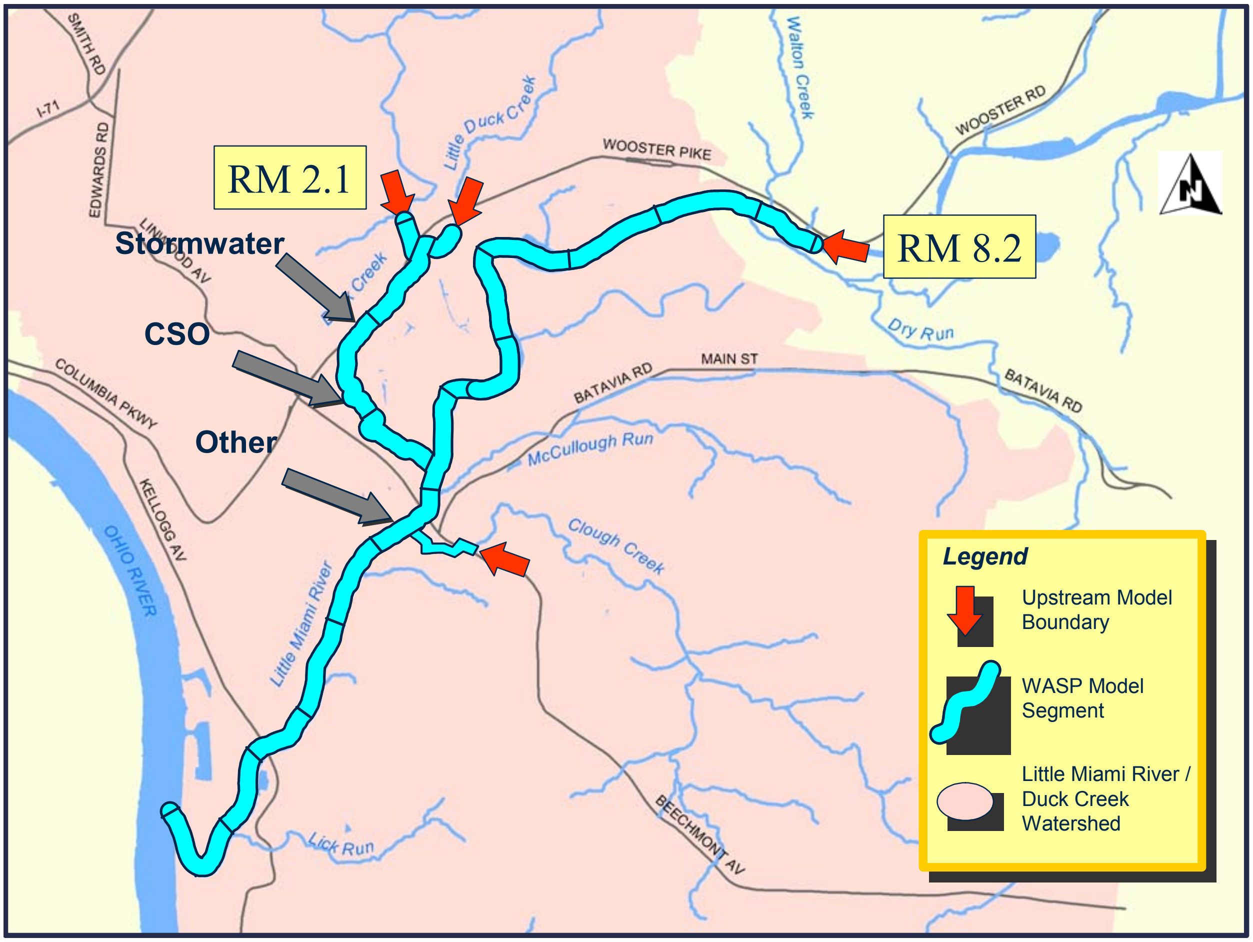

Exhibit 3: Figure 3 Conceptual Mill Creek WASP Model

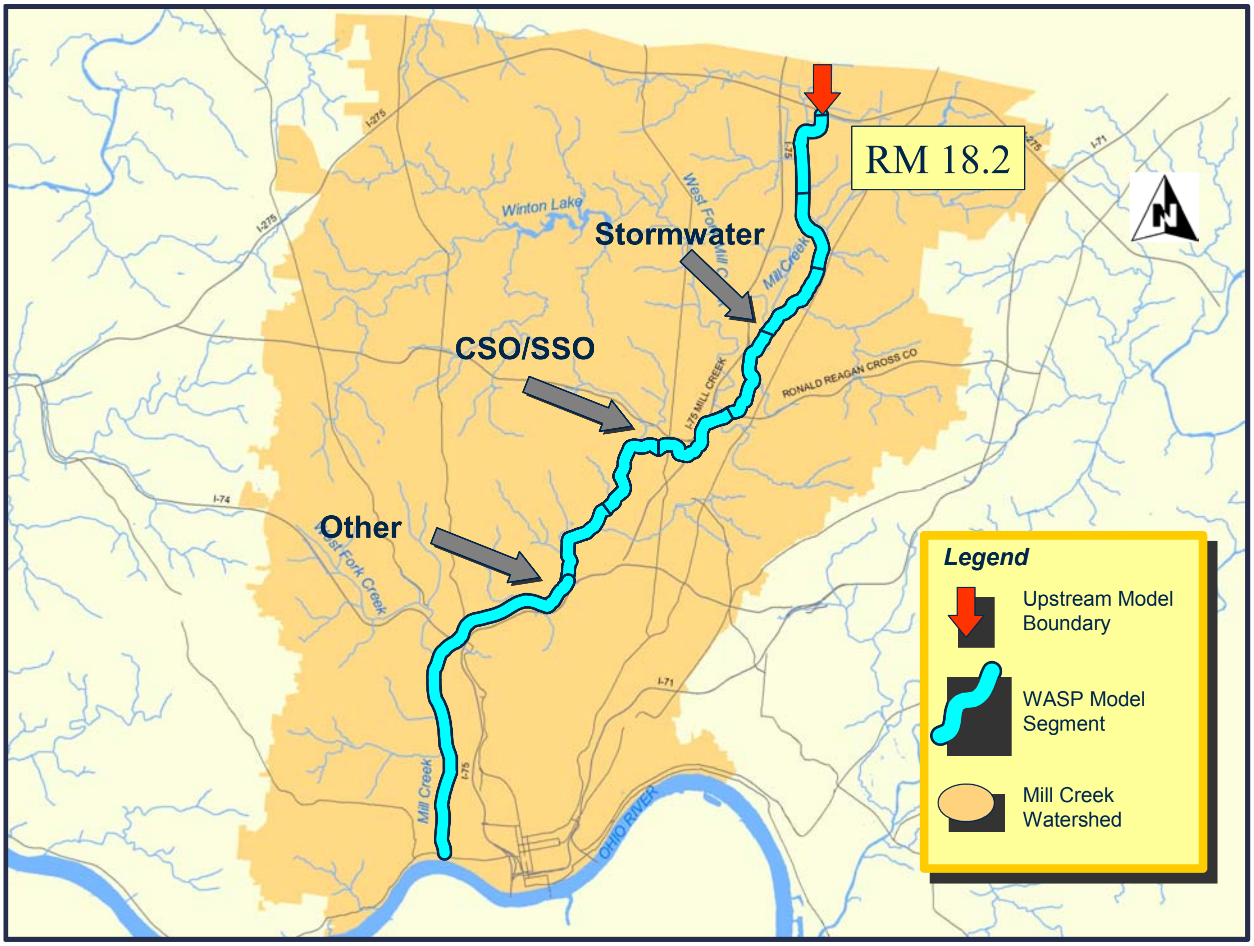

Exhibit 3: Figure 4 Conceptual Muddy Creek/Rapid Run WASP Model

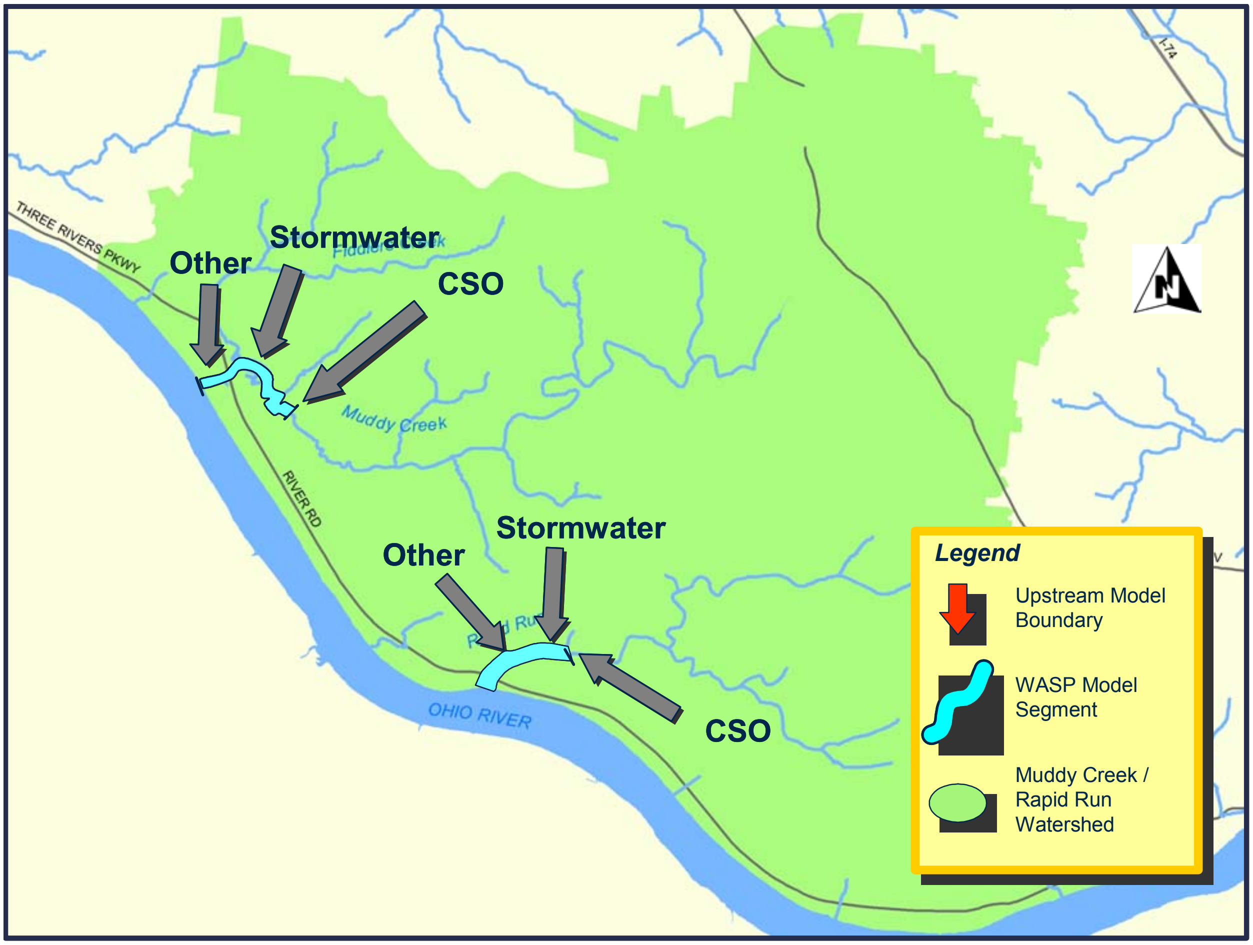

Exhibit 3: Figure 5 Proposed Monitoring Locations for Little Miami River

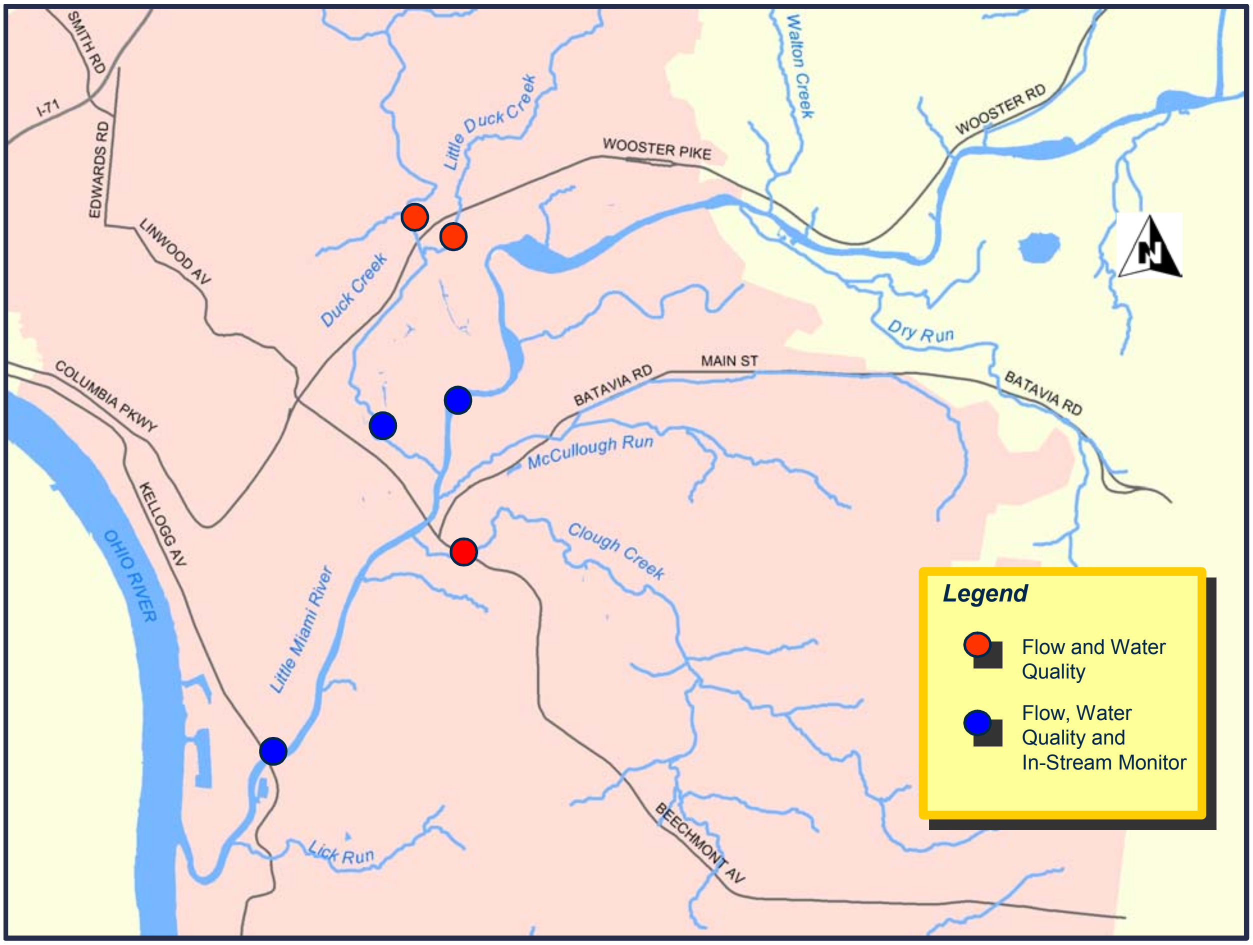

Exhibit 3: Figure 6 Proposed Monitoring Locations for Mill Creek

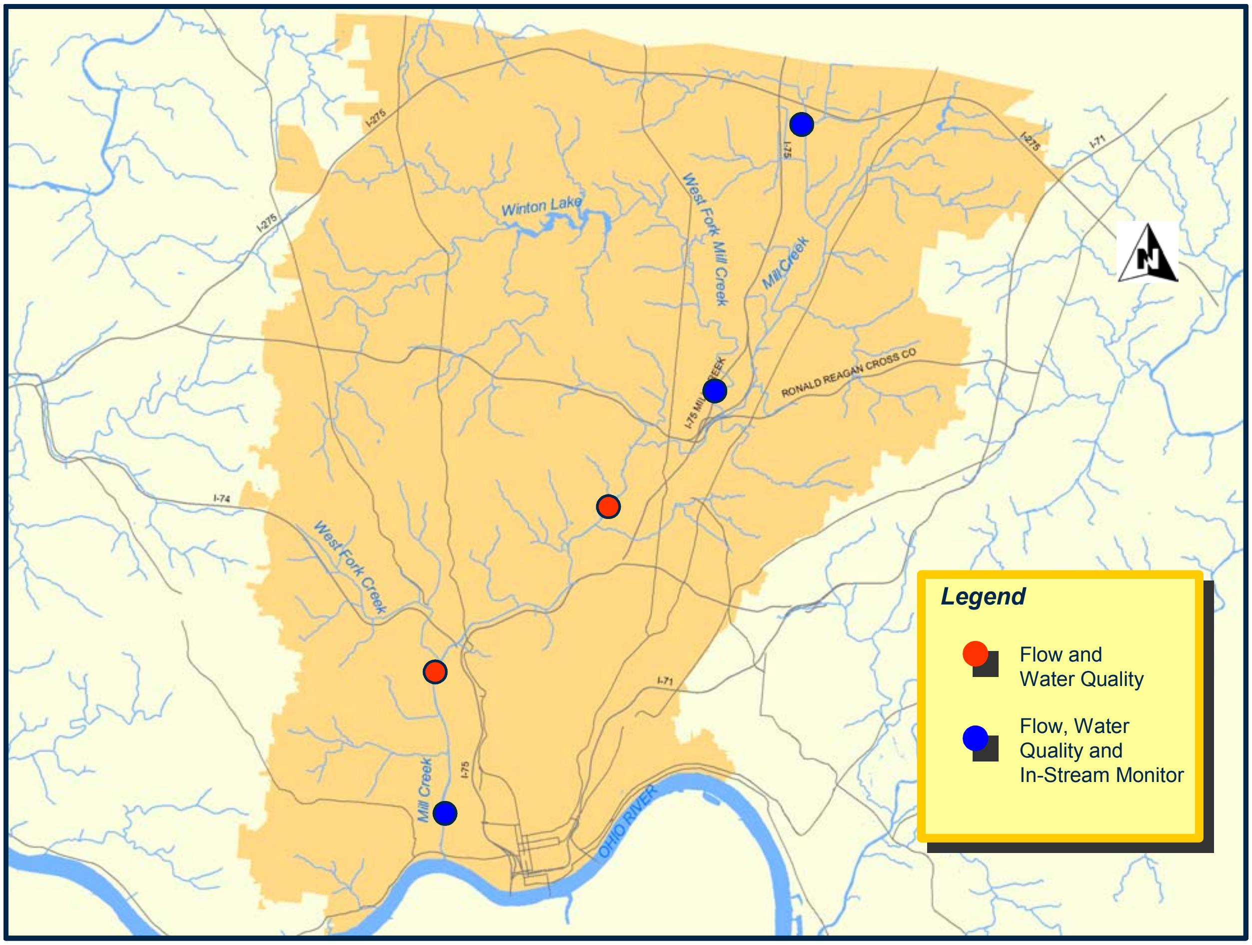

Exhibit 3: Figure 7 Proposed Monitoring Locations for Muddy Creek/Rapid Run